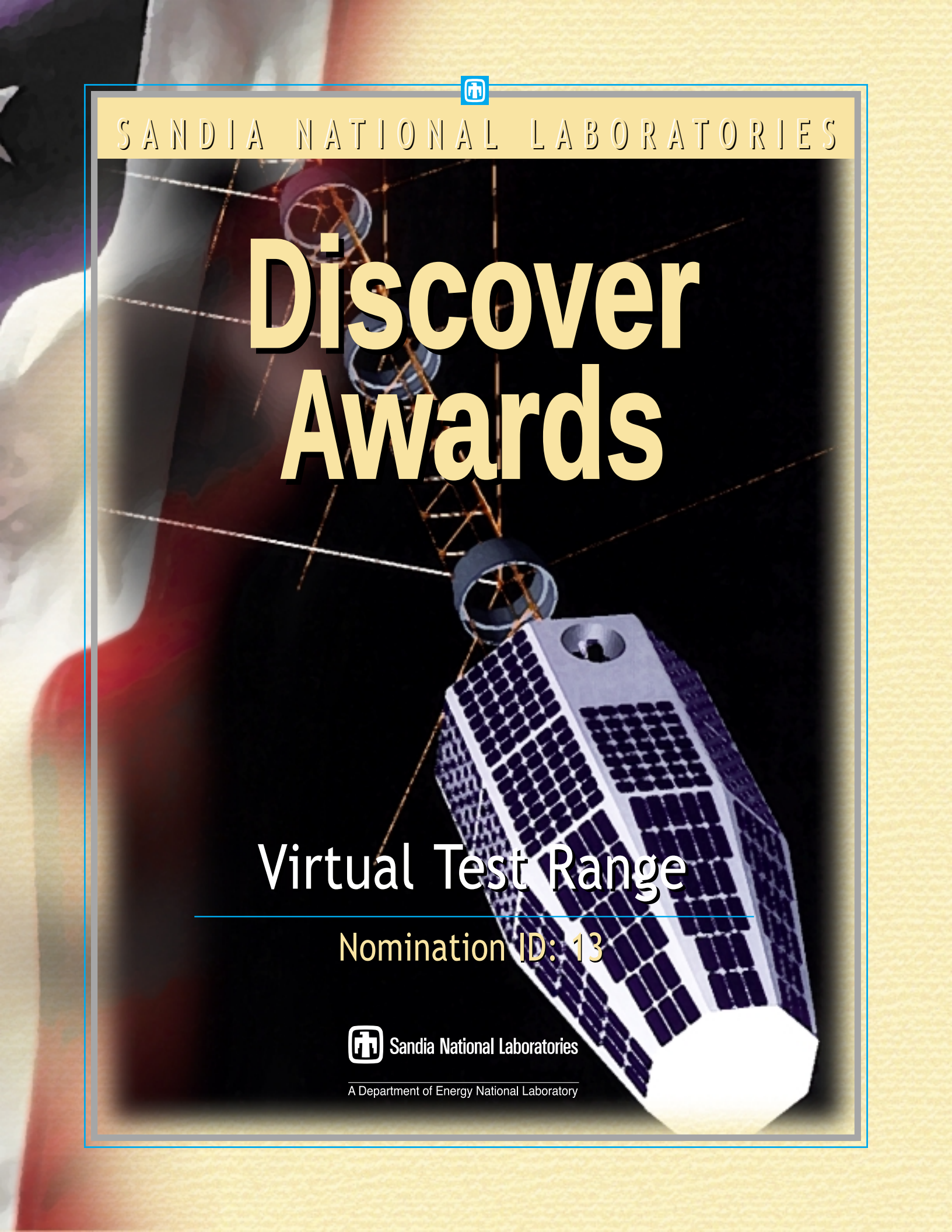
SANDIA NATIONAL LABORATORIES

Discover Awards



Virtual Test Range

Nomination ID: 13

Sandia National Laboratories

A Department of Energy National Laboratory

Virtual Test Range

Award Category:
Communications

Name of innovation:
Virtual Test Range

Describe the innovation in a few sentences.
The Virtual Test Range uses GPS and commercial satellite telephone communications systems to quickly and inexpensively provide telemetry and tracking for field testing systems anywhere in the world. Traditional field testing is typically performed in dedicated ranges that are costly to maintain. In addition, these dedicated test ranges may not accurately reflect the use environment of the system under test. The Virtual Test Range allows system testing to be performed anywhere, anytime with essentially no overhead.

How does the innovation work?
Satellite telephony provides a widely available, low cost alternative to the traditional test range paradigm. Satellite telephony will eventually be available on a global, 24 hour a day, 7 days a week basis. A system test vehicle equipped with a satellite telephone subsystem can receive signals from a remote test vehicle and retransmit them to the ground without requiring any traditional test range assets. Bandwidth and reliability concerns can be mitigated by using multiple channels from several different satellite telephone constellations (i.e., Iridium and Teledesic). Test vehicle RF power transmission requirements should be similar to those of traditional test ranges since these satellite telephony systems are in low earth orbit.

What problem did this innovation solve?
One of the principle functions of test range instrumentation is to collect signals from flight test vehicles. Typically, these signals take the form of digital bits transmitted from the flight test vehicle to the ground. In the past, the capability to receive digital bits from a remote vehicle was not widely available, requiring the development of dedicated test range facilities. The Virtual Test Range provides this capability on demand.

Why is it important?
Each year, up to 10 MMIII and Peacekeeper missions are fielded out of Vandenberg AFB. The cost of each mission is about $10 million in test range support (ground stations, ships, aircraft, etc.) resulting in expenditures of about $100 million/year for the MMIII and Peacekeeper programs alone. Other programs and other test ranges incur additional costs. Implementing this "virtual test range" can eliminate much (all?) of this test range support

and save a significant portion of this cost. In addition, the "virtual test range" will permit instrumented test flights to be conducted anywhere in the world without additional infrastructure.

How will this innovation benefit the average consumer or the public in general?
The consumer always benefits from higher quality products at lower cost. System testing is one of the most costly elements of product development. Much of this cost is related to the collection of data from the test article. The "virtual test range" will reduce the cost of data collection allowing these resources to be directed to more in-depth analysis of new products resulting in higher quality. Savings in test cost can also translate into lower cost to the consumer.

When was this innovation developed, released or launched?
July, 1997

Is any information about this innovation available on the Web?
If so, please gives us the URL:

Who came up with this innovation (list all)?
Edward B. Talbot

Of these people, who is the person MOST responsible for its development?
Edward Talbot
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Whom should we contact if we need more explicit information about the innovation?
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Name of person completing this form:
Edward Talbot

How did you hear about the Discover Awards:
Discover magazine

Are you a subscriber to the magazine:
Yes.

SUPPORTING MATERIALS

REPORTS:

Condreva, K.J., and Yoon, P.Y., "'Global Test Range' Satellite Utilization Overview," Jan. 27, 2000.

Rogers, Rodney L., "Using Commercial Global Personal Communication System for a Global Test Range," New Mexico State University, technical report, December 1999.

Marshall, Lee H., "Global Test Range," Sandia National Laboratories, technical report No. GTR-FR-1-1.1, Sept. 28, 1999.

PRESENTATIONS:

Talbot, Edward B., "Virtual Test Range Concepts and Implementation," Sandia National Laboratories, Feb. 6, 2000.

"ITC/USA '99," International Telemetering Conference, sponsored by the International Foundation for Telemetering, Oct. 25-28, 1999.